Claims

1. A method for CVD coating, wherein:
   - a layer is deposited on a substrate in a carbon containing gas atmosphere,
   - wherein the process parameters are varied during the coating period in such a way that during the coating period a repeated alternation is made between a first operating mode and a second operating mode,
   - wherein in the first operating mode a higher carbon over-saturation of the gas atmosphere occurs near the substrate,
   - and in the second operating mode a lower carbon over-saturation of the gas atmosphere occurs near the substrate.

2. The method according to any one of the preceding claims, wherein
   - during the time in which the layer grows by 1 µm,
   - at least 4 alternations,
   - preferably at least 200 alternations,
   - particularly preferably at least 500 alternations are carried out between the operating modes.

3. The method according to any one of the preceding claims, wherein
   - the first and/or the second operating mode are adjusted to last at least 2 seconds,
   - preferably at least 10 seconds.

4. The method according to any one of the preceding claims, wherein
   - the first and/or the second operating mode are adjusted to last for no more than 500 seconds,
   - preferably less than 50 seconds.

5. The method according to any one of the preceding claims, wherein
   - the duration of the first and second operating modes is selected thus that the quotient of the time durations is between 0.1 and 10, preferably between 0.5 and 2, more preferably the duration of the operating modes is essentially the same.

6. The method according to any one of the preceding claims, wherein

- in the second operating mode a higher process gas temperature is adjusted than in the first operating mode.

7. The method according to any one of the preceding claims, wherein
   - in the first operating mode a higher effective carbon content is set in the coating atmosphere,
   - in the second operating mode a lower effective carbon content is set in the coating atmosphere.

8. The method according to any one of the preceding claims, wherein
   - in the first operating mode a lower oxygen content is set in the coating atmosphere,
   - in the second operating mode a higher oxygen content is set in the coating atmosphere.

9. The method according to any one of the preceding claims, wherein
   - in the first operating mode a higher nitrogen content is set in the coating atmosphere,
   - in the second operating mode a lower nitrogen content is set in the coating atmosphere.

10. The method according to any one of the preceding claims, wherein
    - the effective carbon concentration and each duration of the application of the first and second operating modes is selected in such a way that the following is true:
      $C_u < (C_1*T_1 + C_2*T_2)/(T_1 + T_2) < C_o$
      wherein
      C_u is the lower limit of the effective carbon concentration in the system at which a diamond layer still grows,
      C_o is the upper limit of the effective carbon concentration in the system at which a diamond layer still grows,
      C_1 is the effective carbon concentration in the first operating mode,
      C_2 is the effective carbon concentration in the second operating mode,
      T_1 is the time of application of the first operating mode, and
      T_2 is the time of application of the second operating mode.

11. The method according to any one of the preceding claims, wherein

- the gas atmosphere is predominantly of hydrogen, preferably at a concentration of more than 90%, particularly preferably of more than 95%.

12. The method according to any one of the preceding claims, wherein
- the coating is carried out in a coating chamber,
- into which a process gas is introduced,
- wherein the process gas is thermally disintegrated by a number of hot filaments.

13. A body, having
- a substrate,
- and at least one layer deposited on the surface of the substrate,
- wherein the layer is a nano-crystalline diamond.

14. The body according to claim 13, wherein
- the layer surface has a surface roughness Rz of less than 2 µm, preferably of less than 1 µm.

15. The body according to claim 13 or 14, wherein
- the layer surface has a surface roughness Rz which is less than the surface roughness Rz of the substrate surface.

16. The body according to any one of claims 13 to 15, wherein
- the diamond layer is of unordered, untexturized crystals,
- wherein the crystals are between 5 and 100 nm in size.

17. The body according to any one of claims 13 to 16, wherein
- the body is a tool, preferably a machining tool.

18. The body according to any one of claims 13 to 17, wherein
- additional layers are deposited between the substrate and the nano-crystalline diamond layer and/or on the nano-crystalline diamond layer.

19. An apparatus for CVD coating, comprising
- a vacuum chamber (14), a gas inlet (18), a substrate carrier (20) and means (22) to excite an introduced gas,

- and means (30) to automatically vary process parameters during the coating period, so that during the coating period a first operating mode and a second operating mode are repeatedly alternated,
- wherein in the first operating mode a higher carbon over-saturation of the gas atmosphere occurs near the substrate,
- and in the second operating mode a lower carbon over-saturation of the gas atmosphere occurs near the substrate.

20. The apparatus according to claim 19, wherein
- means are provided for the control of the inflow of carbon-containing gas and an oxygen-containing gas,
- wherein the means for varying the process parameters drive the control means in such a way that in the first operating mode a lower oxygen content and in the second processing mode a higher oxygen content is present in the process gas.